

① $h_i = 12 \text{ m}$ $E_{ki} + E_{Pi} = E_{kf} + E_{Pf}$
 $V_i = 4.0 \text{ m/s}$ $\frac{1}{2}mv_i^2 + mgh_i = \frac{1}{2}mv_f^2 + mgh_f$
 $h_f = 4.0 \text{ m}$ $\frac{1}{2}v_i^2 + gh_i = \frac{1}{2}v_f^2 + gh_f$
 $v_f =$

$$2 \left[\frac{1}{2}v_i^2 + gh_i - gh_f \right] = v_f^2$$

$$\sqrt{2(\frac{1}{2}v_i^2 + gh_i - gh_f)} = v_f$$

$$13.15 \text{ m/s} = v_f$$

② $h_i = 4.0 \text{ m}$ $E_{ki} + E_{Pi} = E_{kf} + E_{Pf}$
 $V_i = 13.2 \text{ m/s}$ $\frac{1}{2}mv_i^2 + mgh_i = \frac{1}{2}mv_f^2 + mgh_f$
 $V_f = 10 \text{ m/s}$ $\frac{1}{2}v_i^2 + gh_i = \frac{1}{2}v_f^2 + gh_f$
 $h_f =$

$$\frac{(\frac{1}{2}v_i^2 + gh_i - \frac{1}{2}v_f^2)}{g} = h_f$$

③ $h_f = 4.9 \text{ m}$ $7.8 \text{ m} = h_i$

④ $V_i = 10 \text{ m/s}$
 $V_f = 0 \text{ m/s}$
 $h_i = 0 \text{ m}$
 $h_f =$

$$E K_i + E P_i = E K_f + E P_f$$

$$\frac{1}{2} m V_i^2 + m g h_i = \frac{1}{2} m V_f^2 + m g h_f$$

$$\frac{\frac{1}{2} V_i^2}{g} = \frac{g h_f}{g}$$

$$\frac{\frac{1}{2} V_i^2}{g} = h_f$$

$$5.1 \text{ m} = h_f$$

⑥ $m_b = 2.5 \text{ kg}$

$m_s = 55 \text{ g} = 0.055 \text{ kg}$

$h = 25 \text{ m}$

$E P_s = m g h$
 $= 13.5 \text{ J}$

$E K_s = 13.5 \text{ J}$

$V = \sqrt{\frac{2(13.5 \text{ J})}{0.055 \text{ kg}}}$

$V = 22 \text{ m/s}$

$E P_b = m g h$

$= (2.5 \text{ kg})(9.8 \text{ m/s}^2)(25 \text{ m})$

$= 613 \text{ J}$

$E K_b = 613 \text{ J}$

$\frac{1}{2} m V^2 = 613 \text{ J}$

$V = \sqrt{\frac{2(613 \text{ J})}{2.5 \text{ kg}}}$

$V = 22 \text{ m/s}$